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Adrift in a Sea of Information about Sustainable Seafood: The Maine Consumer Perspective

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by Catherine V. Schmitt

Seafood provides nutrition for coastal communities throughout the world. Three billion people rely on fish for at least 15 percent of their annual protein supply; in some places, the ocean supplies an affordable source of protein that may not only be cheaper than other animal protein sources, but preferred and part of local and traditional cultures (FAO 2009). Seafood is the most highly traded international food commodity (FAO 2009). The United States imports 80 percent of its seafood, mostly from Asia.

Fish and shellfish have sustained people in Maine ever since the first inhabitants arrived in the wake of the glacier some 13,000 years ago. Maine ranks third in the U.S. in terms the landings value of seafood, at close to $300 million (Lowther 2010). An argument could be made that seafood is more important in Maine than the rest of the nation, with the concentration of employment in the fishing sector 14 times that of any other state (NMFS 2010a; Rose 2004). "Fishing" relates to more than just the 30,000 jobs supported by the wild harvest and aquaculture industry (NMFS 2010b). The harvest of sustenance from tidal rivers, bays, and the ocean is also integral to coastal Maine's cultural identity.

The fishing industry, heritage and identity, in turn, make coastal Maine attractive to tourists. Tourism actually is Maine's largest industry, in terms of total employment (Rose 2004), and eating lobster is one of the most desired experiences among visitors, in addition to visiting coastal villages and beaches (Longwoods International 2005).

Fortunately for Maine's fishing communities, demand for "sustainable,"[1] local, and healthy seafood has increased, reflecting national trends in food interest and concern. But unfortunately for consumers, understanding the complicated and often conflicting information about seafood remains a challenge, despite multiple efforts designed to help seafood consumers make decisions.

This paper reviews the sources of seafood information available to Maine consumers and presents the results of a comparative analysis of several sustainable seafood guides and the information presented on fish and shellfish species that are grown or landed in Maine. This information is then compared to fishery status as reported by the National Marine Fisheries Service (NMFS) and to local efforts to promote fisheries as sustainable. The implications for seafood consumers extend to the sustainability of Maine's coastal communities.

SEAFOOD INFORMATION: DEMAND AND SUPPLY

Since the 1990s, consumer-education campaigns designed to prevent overfishing, reduce bycatch of non-target endangered species, and protect marine habitat created awareness among consumers about the implications of their seafood choices. At the same time, the local food movement expanded to mainstream American culture, as symbolized by the writings of Michael Pollan (e.g., *The Botany of Desire,*

The Omnivore's Dilemma) and the founding of Slow Food USA in 2000. Meanwhile, public health agencies have strengthened their recommendation of seafood as a source for omega-3 fatty acids and micronutrients (e.g., U.S. Department of Agriculture, mypyramid.gov), despite concurrent evidence that certain types of fish and shellfish are more likely to be contaminated with mercury, PCBs (polychlorinated byphenyls), and other chemicals that can be harmful to human beings, especially pregnant women and children (water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/basic.cfm).

These trends have resulted in a demand for seafood-related information, a demand that is being addressed by a diverse array of government agencies, institutions, nonprofit organizations, and private companies through various mechanisms: labeling, certification, guides (web sites, wallet cards, mobile device applications), consumption advisories, and harvesting rules (recreational fishing).

Labeling

Since 2005, federal law requires that retailers such as supermarkets and club warehouse stores label wild and farm-raised fish and shellfish with their country of origin (7 CFR Part 60); however, labels are not required to describe a location more specific than "United States" or "North Atlantic," or how the fish was harvested. Supermarket seafood departments and neighborhood fish markets may or may not know the more specific origin of seafood items. Interpreting country-of-origin labels to the local level requires knowledge of aspects of the seafood industry, such as state versus federal harvesting rules. For example, certain species, such as sea scallops, may be harvested year-round in federal waters (three to 200 miles offshore), but only seasonally in state waters (within three miles of shore).

Beyond mandated labels, certification programs such as that of the Marine Stewardship Council are intended to provide consumers with confidence that selecting seafood products bearing the certification logo is a sustainable choice. In essence, certification programs claim to do the expert research and fact-finding work for the consumer.

However, only one U.S. fishery in the western North Atlantic has been certified to date by the Marine Stewardship Council, the Atlantic deep-sea red crab, an offshore trap fishery that primarily supplies foodservice businesses. The Maine lobster, dogfish, and offshore scallop fisheries are under assessment, with tentative certification dates in 2011.

The Gulf of Maine Research Institute is developing a branding standard for Gulf of Maine seafood, informed by the guidelines of the United Nation's Food and Agriculture Organization (FAO), Marine Stewardship Council, World Wildlife Fund, Global Aquaculture Alliance, and the Maine Aquaculture Alliance. This branding program is expected to launch in Hannaford Supermarkets in 2011.

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Despite these efforts that may alter the situation in the future, a current paucity of labeled, certified fisheries in the Gulf of Maine region forces consumers to turn to the guides produced by national and international environmental advocacy organizations.

Seafood Guides

There are now some 200 sustainable seafood guides around the globe (Jacquet et al. 2009; Seaman 2009). This paper examines how six commonly available, long-standing guides designed primarily for American audiences rate Maine seafood. Some of the guides are national/international in scope (e.g., Greenpeace) while others have specialized guides for individual regions (e.g., Food and Water Watch). The purpose of this analysis is not to evaluate the various methodologies used by the different organizations to rate seafood (typically using a green-yellow-red stoplight schematic), but to evaluate the information from the perspective of a hypothetical Maine-based consumer seeking to choose "sustainable" seafood from the Gulf of Maine.

The ratings of 34 fish and shellfish species harvested in the Gulf of Maine, along with official

stock status and regulatory authority, are presented in Table 1. Of the species that are listed and rated by all six organizations, three species are consistently "red" (Atlantic salmon, halibut, and cod) and three are green (longfin squid, farmed oysters, and farmed mussels). The majority of Gulf of Maine species fall somewhere in between: either rated as "yellow" or not listed by one or more organizations.

Disguised by this ambiguity are characteristics unique to local fisheries, such as seasonality, harvesting/growing methods, and the latest scientific findings. For example, some of the green or yellow species, such as shrimp, bluefish, and mackerel, are available only seasonally. Other species, such as hake, red crab, striped bass, and squid, can be difficult to find. And, as mentioned earlier, country of origin labeling does not address the method of harvest or state of origin. Further, seafood is often mislabled and renamed (Jacquet and Pauly 2008).

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The confusion that results for consumers is illustrated using three examples: scallops, salmon, and lobster.

The U.S. Atlantic sea scallop fishery is one of the most valuable fisheries in the United States and the most valuable wild scallop fishery in the world (Hart 2006). The North Atlantic sea scallop fishery is not considered overfished and is being considered for certification by the Marine Stewardship Council. Nevertheless, sea scallops are on the Greenpeace red list, are rated as yellow by Blue Ocean, Environmental Defense Fund, and Monterey Bay Aquarium, and are not considered ocean friendly by the New England Aquarium. Damage to seafloor habitat is the primary reason for these classifications, which is why Food and Water Watch gives a green light to "dive-caught" scallops. For a consumer, then, the challenge is to determine whether or not the scallops sitting in the refrigerator case at the market are dive-caught. If the fishmonger does not know the answer, and the only label is "U.S. wild-caught," the consumer would have to know that Atlantic sea scallops (*Placopecten magellanicus*) are harvested in Maine waters by hand via scuba diving (diver or dive-caught scallops) only between December and April. During the rest of the year, scallops are harvested by dredge in federal waters (three to 300 miles offshore). Restaurants that serve scallops directly from divers may make this distinction, but supermarkets typically do not.

Salmon is the third-most popular seafood consumed in the United States (Johnson 2010). In placing farm-raised Atlantic salmon on their red lists, the guides cite negative habitat impacts, chemical contamination, threats from escaped fish, and feed use as problems. Yet, what is viewed as unsustainable by a nonprofit advocacy group often conflicts with what local fishermen and aquaculturists consider sustainable (Seaman 2009). Cooke Aquaculture's marine salmon farms and hatcheries in Maine meet the Certified Quality Salmon certification standard of Global Trust. While moderate changes to the benthic environment do occur immediately below salmon pens, these impacts are monitored by the Department of Environmental Protection as required by the salmon farms' Clean Water Act permit (NPDES), and research has concluded that human-caused activities, including salmon aquaculture, are not major contributors to nutrient levels in Cobscook Bay (Garside and Garside 2004; Sowles and Churchill 2004). The Blue Ocean Institute incorrectly states that vaccines are used to treat infected fish, when in fact vaccines are injected at freshwater salmon hatcheries for protection from endemic diseases. Vaccine use has substantially limited the need for antibiotics in Maine, and antibiotic usage is strictly regulated (Christopher Bartlett, personal communication, 2010). Use of pelagic stocks of fish (e.g., menhaden, herring) for fish feed remains a concern, but nutritionists and feed manufacturers have been formulating new diets that contain increased amounts of plant proteins and reduced concentrations of contaminants such as PCBs (e.g., Rust et al. 2010).

TABLE 1: **Seafood Guide Comparisons**

	Blue Ocean Institute	Environmental Defense	Greenpeace International	Monterey Bay Aquarium	Food and Water Watch	New England Aquarium	FishWatch Status	Regulatory Authority
Atlantic salmon, farmed	red	red	red	red	red		OFD	NEFMC
Atlantic halibut	red	red	red	red	red		OFD	NEFMC
Atlantic cod	red	red	red	red	red		OFG	NEFMC
Tuna, Atlantic bluefin	red	red	red	red	yellow		OFG, OFD	NMFS/ICCAT
Flounder	yellow	red		red	red		OFG, OFD	NEFMC
Skate	orange	red	red	red	not listed		variable	NEFMC
Monkfish	yellow	not rated	red	red	yellow		NO	NEFMC
Green sea urchin	not listed	red		red	not listed		not listed	DMR
Redfish	not listed	not listed	red	not listed	yellow		NO	NEFMC
Clams, hard	green	yellow	red (ocean quahog)	yellow	green (hand-raked, farmed)	green	NO	Mid-Atlantic
Sea scallops	yellow	yellow	red	yellow	Green (dive-caught)		NO	DMR/NEFMC
Eel	yellow	not rated		red	yellow		unknown	DMR
Dogfish	green	red (all shark)	red (all shark)	yellow	yellow		NO	NEFMC
Tuna, albacore	green	green	red	green	green		OFG, OFD	NMFS/ICCAT
Swordfish	green	yellow	red	green	yellow		NO	ICCAT
Black sea bass	yellow	yellow		yellow	not listed		NO	ASMFC
Hake	not listed	yellow		yellow	not listed		OFG, OFD	NEFMC
Crab, jonah	not listed	yellow		yellow	yellow		not listed	DMR
Herring (sardines)	green	yellow		yellow	yellow		NO	DMR/NEFMC
Haddock (hook/line)	yellow	yellow		yellow	green	green	NO	NEFMC
Shrimp	green	yellow		yellow	yellow	green	NO	ASMFC
Lobster	green	yellow		yellow	green		NO	ASMFC
Bluefish	green	not rated		yellow	yellow	green	NO	ASMFC
Striped bass, wild	green	not rated		green	yellow		NO	ASMFC
Crab, red	not listed	not listed		not listed	not listed	green	NO	NEFMC
Clams, softshell	not listed	green		green	green		N/A	municipal
Atlantic mackerel	green	not rated		green	green	green	NO	DMR
Squid (longfin)	green	green		green	green	green	NO	Mid-Atlantic
Oysters, farmed	green	green		green	green	green	N/A	DMR
Mussels, farmed	green	green		green	green	green	N/A	DMR
Wolffish	not listed	not rated		not listed	not listed		unknown	DMR
Smelt, East Coast	not listed	not rated		not listed	not listed		not listed	DMR
Shad	not listed	not rated		not listed	not listed		not listed	ASMFC
Menhaden	not listed	not listed		not listed	not listed		NO	ASMFC
Whiting	not listed	not listed		yellow	yellow			

See table notes in sidebar on next page.

Seafood Guide Comparisons: Notes

An overfished stock or stock complex is one whose size is sufficiently small that a change in management rules is required to achieve an appropriate level and rate of rebuilding. The Magnuson-Stevens Fishery Conservation and Management Act currently mandates that overfished stocks be rebuilt as soon as possible and within a time-frame not longer than 10 years. Overfishing relates to the rate at which a stock of fish is harvested and occurs when that rate exceeds an acceptable level, eventually resulting in the stock becoming overfished.

Regulatory Authority: Fisheries, depending on where harvesting takes place and the structure of the harvested population, are regulated by the Maine Department of Marine Resources (DMR), National Marine Fisheries Service (NMFS), and/or regional fishery management councils including the Atlantic States Fisheries Management Council (ASFMC) and the New England Fisheries Management Council (NEFMC). These management entities are responsible for assessing stock status and setting annual harvesting rules.

Blue Ocean Institute Guide to Ocean Friendly Seafood (www.blueocean.org/seafood/seafood-guide)
Nonprofit marine advocacy organization founded by Carl Safina in 2003. The guide provides seafood health/contaminant information in partnership with Environmental Defense. "Orange" species were classifed as yellow and chartreuse species as green.

Environmental Defense Fund (www.edf.org/seafood)
Nonprofit legal and scientific environmental organization founded in 1967. Seafood ratings are based on research conducted by Monterey Bay Aquarium and include health information.

Greenpeace USA
(www.greenpeace.org/usa/en/campaigns/oceans/seafood/)
Nonprofit advocacy organization founded in 1970 to protest nuclear bomb testing and, in 1976, to save the whales. Greenpeace only identifies "red list" fish.

Monterey Bay Aquarium
(www.montereybayaquarium.org/cr/seafoodwatch.aspx)
Nonprofit research and education corporation, launched the Seafood Watch program in 1997.

Food and Water Watch
(www.foodandwaterwatch.org/fish/seafood/guide/)
Nonprofit advocacy organization focused on food and drinking water issues founded in 2005. According to the organization, their National Smart Seafood Guide and Regional Seafood Guides also account for socio-economic impacts on coastal and fishing communities. "Recommended" fish are classified as green and "dirty dozen" as red, with others as yellow.

New England Aquarium
(www.foodandwaterwatch.org/fish/seafood/guide/)
Private, nonprofit education and scientific corporation founded in Boston in 1969. The aquarium lists only recommended "ocean friendly" seafood, classified as green.

FishWatch (www.nmfs.noaa.gov/fishwatch/#)
FishWatch is an information product of the NMFS of the National Oceanic and Atmospheric Administration that provides seafood facts based on fish stock assessments, fishery evaluations, and fishery management plans and amendments. The Fishwatch status indicates whether there is overfishing (OFG) or the species is already overfished (OFD).

The online versions of the guides were accessed in November 2010.

Perhaps surprising from a Maine perspective, of the six organizations evaluated, only two rate American lobster as green. The most local organization, New England Aquarium, does not list Gulf of Maine lobster as an ocean-friendly seafood recommendation because of concerns about the impact of lobster fishing gear on endangered North Atlantic right whales (Michelle Cho, personal communication, 2011). The organizations that rate lobster as yellow cite uncertainty about the status of the fishery, perhaps because of concerns about the health of the southern New England population. The latest peer-reviewed stock assessment of American

lobster determined that the Gulf of Maine lobster fishery is not overfished (American Lobster Stock Assessment Committee 2009). To understand the difference, a consumer would have to know that fisheries are managed as stocks, subpopulations of a species. As with lobster, it is possible that one subpopulation (e.g., Long Island Sound) could be depleted while an adjacent stock (e.g., Maine) is healthy. Despite occasional efforts to certify/brand "Maine" lobster, localized source identification is not always provided at the retail level. Traceability is complicated due to supply chain and distribution issues; however, trap-to-plate tracking is likely to occur in the future due to consumer demand (Dane Somers, personal communication, 2011).

Local Food Branding and Marketing

The current popularity (rediscovery?) of locally produced, minimally processed food has many Americans, including Mainers, asking questions about where their food comes from, how it was grown, and by whom. If decisions about sustainability included the distance seafood travels from sea to plate and the fuel used in harvesting and transporting fish, industrial fisheries would probably be considered far less sustainable than small-scale fisheries (Jacquet et al. 2009), lending further support to the "buy local" philosophy.

Maine's emergence as a food destination (e.g., *Bon Appétit* blog by Andrew Knowlton) only sharpens the demand for information about seafood sold and served here. (See also articles by Lindenfeld and Silka and Nangle, this issue.) Certainly tourists want to eat Maine seafood (Longwoods International 2005), and year-round residents do, too: a recent survey of 1,013 residents of the greater Portland area found local seafood is important to Maine consumers (www.gmri.org).

Efforts to promote Maine seafood are making up for many years without a cohesive marketing strategy or program. While government-funded marketing and promotion efforts peaked in the wake of the 1976 Magnuson-Stevens Fishery Conservation and Management Act, private and cooperative interests are now taking responsibility for promoting Maine seafood, thus raising consumer awareness (Schmitt 2009).

Several community-based organizations, such as Penobscot East Resource Center, Northwest Atlantic Marine Alliance, and Midcoast Fishermen's Association, have created local markets for community-supported fisheries, modeled after successful community-supported agriculture programs in which customers pay up front for a "share" of the season's harvest, which is delivered on a regular basis. These and other community groups, such as the Cobscook Bay Resource Center, are serving as hubs for connecting producers and consumers at the local level through farmers' markets, restaurants, and small retail outlets.

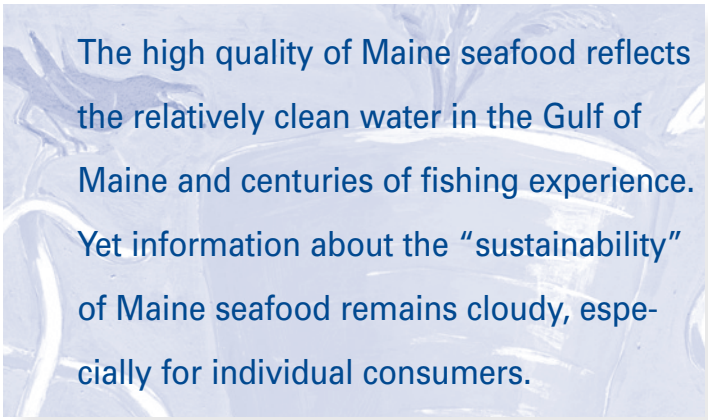
The deficit in local seafood falls on the side of supply. For example, gourmet chefs nationwide are rediscovering sardines as a healthy, sustainable seafood choice (see Grescoe 2008), but this option is out of reach for consumers in Maine, where the last American sardine cannery closed in April 2010 and where the majority of fresh "sardines" (Atlantic herring) are used as lobster bait and not commonly available in a retail setting.

Losing the supply of local seafood would likely have great impact on tourism in Maine and on life in Maine's coastal towns and villages. (What would a visit to the Maine coast be without a lobster roll at Red's Eats, made from lobster pulled from one of the traps attached to the colorful buoys floating in the background? What if the fried clams were shipped in from Asia? Would people still want to visit?).

Health Information and Fish Consumption Advisories

Seafood information does not always incorporate safety and health information. The Maine Department of Marine Resources (DMR) administers the Marine Biotoxin Monitoring Program for red tide, a microscopic organism that produces toxins that can cause paralytic shellfish poisoning. When red tide has been detected, or after heavy rainfall, which flushes bacteria into coastal waters, the DMR closes shellfish harvesting areas to prevent contaminated clams and mussels from reaching consumers. The Maine Center for Disease Control and Prevention is responsible for issuing fish consumption advisories (MSRA 22 § 1696 I) due to the presence of harmful chemicals such as mercury, dioxins, and PCBs. For example, the safe-eating guidelines prohibit consumption of striped bass, bluefish, shark, and swordfish by pregnant and nursing women, women who may get pregnant, nursing mothers, and children under eight years old.

These warnings do not always filter into local promotion efforts or sustainability campaigns, and as a result consumers who are concerned about their intake of mercury or other toxic chemicals must be aware of the consumption advisories or obtain seafood safety information from additional sources and reconcile their findings with other types of sustainability information.



The high quality of Maine seafood reflects the relatively clean water in the Gulf of Maine and centuries of fishing experience. Yet information about the "sustainability" of Maine seafood remains cloudy, especially for individual consumers.

Recreational Fishing Information

Harvesting one's own seafood may be an appealing alternative to grappling with existing sustainable seafood information. Individual harvesting ensures that seafood consumed is local, and avoids the kind of mental expenditure necessary to evaluate fishery status, harvesting method, and environmental impacts of a given type of seafood.

With hundreds of out-of-state anglers and thousands of fishing trips per year (Lowther 2010), recreational fishing is a valuable component of coastal economies. Further, accessible fishing opportunities are especially important to lower-income families in Maine, who are more likely to keep and eat the fish they catch (Athearn and Bartlett 2008).

However, a Maine consumer seeking to harvest his or her own fish and shellfish would need to turn to an additional information source, the Maine DMR, to locate harvesting rules and regulations. Still other resources, such as private web sites or charter boats, would have to be accessed for information on where, when, and how to harvest seafood recreationally.

DISCUSSION

Recent trends in demand for sustainable, local, and healthy food extend to seafood. To satisfy these cravings, a multitude of labels, certifications, pocket guides, web sites, and other publications have been produced to inform and in some cases influence the decisions of seafood consumers. Guidance materials do not always reach consensus (Roheim 2009), and as illustrated by Table 1, translating voluminous sustainability information to the local level is fraught with uncertainty and complexity. Local, sustainable, and healthy are not necessarily equal. Further complicating the situation is the reality that consumers cannot always be sure that the seafood they purchase is the fish that the label or menu claims; seafood is often mislabeled and renamed (Jacquet and Pauly 2008).

Evaluating seafood information requires an amount of time and expertise that could be overwhelming enough to lead some consumers to ignore the information and either eat what they want or simply avoid eating seafood altogether. These solutions are not helpful to places like Maine, where the coastal economy is highly dependent on seafood for employment, income, community character, and sustenance.

The success of initiatives such as labeling, third-party certification, and community-supported fisheries may require that consumers are willing to pay a premium for sustainability to cover the costs of investment in governance, equipment, and infrastructure (Smith 2010). For this reason, and because consumer campaigns have had limited impact on increasing threatened and depleted marine animal populations and habitats (Jacquet et al. 2009), efforts to promote sustainable seafood are aiming higher in the demand chain, focusing on affecting large buyers and retailers that consolidate seafood purchases, for a bigger and faster market impact (GMRI 2009; Jacquet et al. 2009).

For example, Greenpeace has evaluated sustainable seafood sourcing, labeling, and sales policies of 20 U.S. supermarket chains (Trenor 2010). Rather than calling on consumers to avoid red list species, the Greenpeace campaign pressures food retailers to remove red-listed species from their product offerings. In the Greenpeace ranking (one being the best sustainable seafood policy and 20 being the worst), Maine's primary supermarket

chains placed eighth (Hannaford), ninth (Walmart), and 15th (Shaw's). Whole Foods, which has one store in Portland, ranked third. Target's grocery division, SuperTarget, ranked number one, but currently there are no Targets with fresh grocery departments in Maine.

Other initiatives are taking a grassroots approach to working with producers. In 2009, Maine's Eat Local Foods Coalition launched the "By Land and By Sea" project to encourage collaboration between the agricultural and marine fishing sectors, with the goal of leveraging resources and increasing efficiency through a shared understanding of the mutual challenges and opportunities facing Maine's farmers and fishermen (Beal, this issue; Tyler 2010).

As national and international sustainable seafood programs trickle down, and local grassroots movements scale up, information about Maine seafood is likely to increase in volume and accessibility, presenting continued challenges for consumers while simultaneously generating support for Maine's coastal economy.

The high quality of Maine seafood reflects the relatively clean water in the Gulf of Maine and centuries of fishing experience. Yet information about the "sustainability" of Maine seafood remains cloudy, especially for individual consumers. As fishing constricts due to regulations and shifts in response to ecosystem changes, the pursuit of sustainable, local, healthy fish and shellfish from Maine could become more difficult. The challenge for Maine's seafood industry and coastal communities continues to be about creating and maintaining demand without risking the supply that is so important to the state. For consumers, the best source of sustainable seafood information might be found in learning more about Maine's fishing communities and marine resource economy.

ENDNOTES

1. "Sustainable seafood" is the harvesting of seafood from capture fisheries and aquaculture using means that meet the needs of the present without compromising the ability of future generations to meet their own needs (1987 Brundtland Report to the United Nations World Commission on Environment and Development).

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